United States General Accounting Office

Report to the Honorable Kent Conrad, U.S. Senate

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AGRICULTURAL TRADE

Determining Government Support Under the U.S.-Canada Free Trade Agreement

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GAO

United States
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Resources, Community, and
Economic Development Division

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February 11, 1991

The Honorable Kent Conrad
United States Senate

Dear Senator Conrad:

Your letter of October 26, 1989, expressed concerns about the formula used in the United States-Canada Free Trade Agreement to calculate levels of government support for agriculture. Specifically, you asked how well this formula measures agricultural trade distortion. Trade distortion is the difference between what farmers would produce and sell on the world market with agricultural government support programs and what they would produce and sell in the absence of such programs. Although both the United States and Canada provide support programs to their farmers, U.S. markets are open to Canadian grain products; but Canada will not open its markets to certain U.S. grain products until the level of government support for these commodities becomes equal to or less than Canada's. The formula in the Free Trade Agreement is used to determine when Canada should open its markets to these grain products.

Results in Brief

The formula used in the Free Trade Agreement does not directly measure trade distortion caused by government subsidies; rather, it measures the percentage of producer income that results from government support. It expresses the level of government support as a ratio of government agriculture subsidies to producer income. Therefore, this method has limited ability to directly measure trade distortion caused by government support. Despite this limitation, it is valuable for trade negotiations because of its relative simplicity and acceptability among trading parties. In addition, it estimates the effects government subsidies have on producer income, and the information used in the formula is relatively easy to obtain.

Other methods could be developed to more directly measure the trade-distorting effects of government support. These methods would measure trade distortion in terms of production rather than producer income. However, they would probably be based on sophisticated econometric models, which rely on assumptions that economists and negotiators would have to agree on. In addition, economists would have to chose from a variety of different estimating techniques, and data needed for use in these models are difficult to obtain. Therefore, these methods

were not practical for use at the time that the Free Trade Agreement was negotiated. However, these methods could become valuable for future negotiations if a consensus on assumptions and techniques can be reached and the data needed for these models become more readily available.

Background

On January 2, 1988, the United States and Canada—the world's largest trading partners—entered into the Free Trade Agreement. The countries negotiated the Agreement, effective January 1, 1989, with the goal of eventually eliminating trade barriers to improve market access for each country's goods and services. As part of the Agreement, both countries agreed to eliminate virtually all tariffs between them within 10 years.

The agricultural chapter of the Agreement includes a provision on market access for grain and grain products. Canada protects its domestic producers from import competition by requiring import permits for some U.S. grain products. This provision requires Canada to eliminate its import permit requirements for wheat, barley, oats, and associated products when the United States' level of government support for these commodities becomes equal to or less than Canada's.

To measure the level of government support, the Agreement includes a formula—which was derived from a method called Producer Subsidy Equivalent (PSE)—that calculates the income producers receive as a result of government programs. (See app. I for a description of the PSE support formula.) Economists developed PSEs in the early 1970s as a shorthand way to measure government support of agriculture. The Organization for Economic Cooperation and Development (OECD)[1] has used and further developed PSEs extensively in the 1980s to monitor government support in member countries. The U.S.-Canada Free Trade Agreement represents the first time that such a measure of government support has been used in a trade agreement.

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[1] OECD is an international organization of 24 industrialized nations. Its basic purpose is to contribute to economic growth, employment, financial stability, and a rising living standard in member countries, and to promote economic development and trade.

PSE Does Not Directly Calculate Trade Distortion

Reducing trade distortion was a major goal of the Free Trade Agreement. The Agreement's measure of government support calculates trade distortion indirectly because it measures government support in terms of producer income and calculates that support as if (1) every dollar that governments spend on agriculture distorts trade and (2) every dollar that governments spend distorts agricultural trade equally.

Actually, the trade-distorting effect of each dollar spent on agricultural programs may vary because government programs affect crop production differently. For example, some programs may not distort trade at all, at least in the short run. To directly calculate total trade distortion resulting from government agricultural programs, it would be necessary to analyze how expenditures affect each program's production.

Direct Trade Distortion Measures Not Yet Practical for Trade Negotiations

Economic techniques and models could be developed that would measure trade distortion by how government programs affect production rather than by how much income they provide to producers. These techniques would be particularly useful in measuring the effect of acreage set-aside[2] and other supply-control programs that are not easily measured in terms of their effect on income. (See app. II for our analysis of the set-aside example.)

The practical difficulties of negotiating trade agreements based on direct measures of trade distortion are significant, however. Direct measures of trade distortion are production-based and are much more complicated to develop because they depend on knowing what effect each government program has on the production decisions of farmers. Although the relationships between government agriculture programs and farmers' production decisions have been and continue to be studied, there is no widespread agreement in the United States, Canada, and other countries about the effect of government policies on production. Consequently, there is no commonly accepted production-based methodology for measuring government support.

A measure of government support based on agricultural production rather than income could be of value in future trade negotiations if it could be made a more practical measure of trade distortion. Before it could replace an income-based measure in future negotiations, however,

[2]Acreage set-aside programs are among several supply-control measures used to reduce commodity production and costs of commodity support. When set-aside requirements are in effect, farmers must reduce the amount of land they cultivate to receive government support payments.

production-based methodologies for calculating trade distortion would have to gain more acceptance than they currently have.

In developing our responses for this report, we obtained information from the U.S. Department of Agriculture, the U.S. Office of the Trade Representative, and the Canadian Embassy to the United States. We reviewed publications produced by the OECD, the U.S. Department of Agriculture's Economic Research Service, and the International Agricultural Trade Research Consortium. In some cases, we discussed the issues with the authors of these publications. We also consulted with economists who have worked on the theoretical issues concerning the measurement of government agricultural support.

We discussed our findings with officials from USDA and incorporated their comments where appropriate. Our work was conducted in accordance with generally accepted government auditing standards.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 7 days after the date of this letter. At that time we will send copies of this report to the Secretary of Agriculture; the Director, Office of Management and Budget; and other interested parties. Copies will be provided to others on request. If I can be of further assistance, please contact me at (202) 275-5138. Major contributors to this report are listed in appendix III.

Sincerely yours,

W E Gahr

for

John W. Harman
Director, Food and
    Agriculture Issues

Contents

Abbreviations

OECD   Organization for Economic Cooperation and Development
PSE   Producer Subsidy Equivalent

Calculating the Agreement's Level of Government Support

To measure the level of government support, the Agreement includes a formula—which was derived from a method called Producer Subsidy Equivalent (PSE)—that calculates the income producers receive as a result of government programs. The level of government support is expressed as a ratio of government agricultural payments to producer income. The numerator expresses the total of direct and indirect government support for each commodity (wheat, oats, and barley) in 1 crop year. Deficiency payments—payments the government makes to farmers to compensate for the difference between the actual market price and a legislatively set price[1] —are an example of direct government payments to producers. Inspection and research programs, which help farmers but do not include funds paid directly to them, are examples of indirect support. The denominator measures total producer income by adding the market value of production for each of these commodities and direct government payments to producers. See table I.1 for more information.

The numerator and denominator also include a credit for each country's supply-control programs. The Agreement's measure of government support provides a credit for supply-control programs because these programs limit the amount that farmers can produce and earn. These credits estimate profits lost as a result of each country's supply-control programs.

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[1]When the government loan rate is higher than the actual market price, the deficiency payment represents the difference between the loan rate and the target price (which is established by legislation).

Table I.1: U.S. Government Support for Wheat, Crop Year 1987

Dollars in millions (sections III-VII)

Government support	1987
I. Level of production in million metric tons	57 36
II. Producer price-dollars per ton	$95 84
III. Value of production	$5.496 83
IV. Direct payments	$3.129 09
V. Adjusted producer value	$8 625 92
VI. Policy transfers to producers	
A. Direct payments	$3.129 09
1. Payments of the CCC	3.279 06
a. Deficiency payments	3.279 06
b. Disaster payments	0 00
c. Diversion payments	0 00
2. CCC storage payments	144 75
3. Conservation Reserve Program	102 47
4. Acreage Reduction Program (Set-asides)	−479 54
5. Certificate premiums and discounts	82 35
B. Other support	2.178 27
6. CCC loan forfeiture benefits	105 51
7. Price enhancement	1 433 00
8. Advance payments benefits	9 65
9. Crop insurance	1 64
10. Government service programs	103 56
i. Federal grain inspection	0 35
ii. Research and extension	44 05
iii. Irrigation	4 18
iv. Inland waterways freight	17 60
v. Conservation	27 34
vi. Rail freight	0 79
vii. Low interest loans for rail	1 62
viii. Cooperator export programs	1 07
ix. Marketing services	0 64
x. Plant disease and pest control	4 59
xi. Targeted export assistance	1 34
11. CCC commodity loans	308 47
12. State budget outlays	106 00
13. Farm credit programs	110 43
VII. Total government support	$5.307 37
VIII. Government support (percent)	61 53

Note Pursuant to Article 705 and Annex 705 4 of the United States-Canada Free Trade Agreement

Source U S Department of Agriculture, adapted by GAO

The calculations of government support for crop year 1987 showed that the U.S. government provided wheat producers with $3.129 billion in direct payments (including the set-aside credit) and $2.178 billion in indirect support. Added together, the total of $5.307 billion represents government transfers to producers, which serves as the measure's numerator. To derive the measure's denominator, known as the adjusted producer value, analysts added the market value of wheat production for 1987 ($5.497 billion)[2] to the amount of direct payments ($3.129 billion) to obtain $8.626 billion. The ratio of the numerator and the denominator show that in crop year 1987, government support equaled 61.5 percent ($5.3 billion of $8.6 billion) of the wheat producers' income. Equivalent calculations for the same crop year showed government support accounted for 46.7 percent of the income of Canadian wheat producers.

Table I.2 identifies the United States' and Canada's levels of government support for wheat (in terms of 2-year averages) since they have been calculated under the Agreement. For the purposes of the Agreement, officials use an average of the 2 most recent crop years annually to determine when import restrictions can be lifted. As a result of both years' calculations, U.S. wheat producers are still subject to Canada's import restrictions.

Table I.2: U.S. and Canadian Wheat—Levels of Government Support

Country	Level of Government Support	
	1989[a]	1990[b]
United States	61.62	45.80
Canada	46.28	44.83

[a]Average of levels of government support for crop years 1986 and 1987

[b]Average of levels of government support for crop years 1987 and 1988

[2]Calculated by multiplying 57.36 million metric tons of wheat by the average producer price of $95.84 per ton.

The Agreement Does Not Directly Account for the Effects of Acreage Set-asides

The Agreement's measure of government support does not directly measure the effect of acreage set-aside programs on commodity production. Generally, the effect of set-aside requirements are more directly measured in terms of production rather than income. As a result, the Agreement's method for calculating the effect of U.S. set-aside programs—under some circumstances—underestimates the amount that these programs offset the trade-distorting effect of other U.S. programs that support agriculture.

Production-based methodologies would more closely measure the extent to which placing acreage into the set-aside program offsets the trade-distorting effects of U.S. income support programs; but these methodologies are not yet practical for use in trade agreements. It is important to note, however, that the use of a production-based methodology would be applicable to both the United States and Canada. In addition, it probably would be impractical to treat only the acreage set-aside programs with a production-based methodology and the other government programs with an income-based approach. All support factors would have to be subject to measurement according to how they affected production and trade distortion. Therefore, it is not possible to state which country would benefit more from the switch to a production-based methodology, especially without knowing how producers respond to government programs such as support prices and set-aside levels. Additional detailed econometric research and analysis would be needed to determine what the total effect would be on the calculated level of U.S. and Canadian government support.

Measuring the Effects of Acreage Set-aside Programs

The Agreement measures the effect of U.S. acreage set-aside programs by calculating the amount of profit producers forego when not producing on the set-aside acreage. Because U.S. agriculture programs provide farmers with target prices that sometimes exceed the world market price, the programs encourage farmers to produce more than they would if they only received the world market price. The U.S. acreage set-aside programs, however, encourage farmers to restrain production, despite the high target prices. These programs, therefore, reduce farmer income and thus offset some or all of the support farmers receive from other government programs.

The OECD's PSE, upon which the Agreement's measure is based, does not contain a credit for set-aside programs, in part because the program does not transfer income to producers. Instead, it is a regulatory program, and its costs cannot be calculated directly from either government budgetary data or the difference between domestic and world prices.

The United States negotiated a provision that it believed would account for the effect of its set-aside programs.[1] This provision estimates the profits producers lose from not planting on their set-aside acreage. Under the Agreement, foregone profits are calculated by taking the difference between the revenue producers would have received per acre from the sale of production on set-aside acreage (at world prices) and the national average variable cost of production per acre—that is, the costs of seed, fertilizer, fuel, water, labor, and other farming inputs. To determine the total amount of foregone profit, these factors are multiplied by the number of acres in the set-aside program.[2] This amount of foregone profit is then deducted from the total of direct government payments, which appear in both the numerator and denominator of the government support calculation.

Under the Agreement, the credit for acreage set-aside programs depends on the difference between the foregone revenues per acre on the set-aside acreage and the national average variable cost of production per acre (which is used to estimate the amount farmers would have to spend to produce crops on the set-aside acreage). The United States would receive no set-aside credit when the national average variable cost of

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[1] As a result of the negotiations, Canada also received a credit for income foregone because of restrictive Canadian Wheat Board delivery quotas.

[2] An adjustment is also made for anticipated differences in yield between set-aside and planted acres because farmers tend to set aside less productive land. They also tend to cultivate more intensively when they are required to set aside acres.

production is higher than the revenue producers would receive from the sale of production on set-aside acreage at world price. Conversely, the United States would receive a set-aside credit when the national average variable cost of production is lower than the revenue producers would receive from the sale of production on set-aside acreage at world price.

Using A Production-Based Method to Account for the Effects of Acreage Set-aside Programs

By focusing on the amount of profit farmers forego, the Agreement does not directly measure the extent to which set-aside programs offset the trade-distorting effects of the target price program. To do so, the Agreement would have to measure the effect acreage set-aside programs have on production rather than on producer profit.

The following three scenarios demonstrate the practical differences between using the Agreement's income-based PSE and a production-based methodology for determining the effect of acreage set-aside programs. The scenarios demonstrate that in contrast to a production-based methodology, the Agreement's set-aside acreage adjustment does not directly reflect the extent to which set-aside acreage offsets the trade-distorting effect of the income support programs. The first scenario shows a situation in which the United States may receive a credit for its set-aside acreage under the Agreement even though the set-aside is larger than what was needed to offset the trade-distorting effects of the producer support price. The second and third scenarios show situations in which the United States would not receive credit for its set-aside acreage under the Agreement (as it would under a production-based method), even though the United States' set-aside requirements reduce the trade-distorting effects of its income support programs.

Scenario #1

The first scenario demonstrates a situation in which the Agreement would provide the United States with too large of a set-aside credit. Such a situation would occur when the United States establishes set-aside requirements that are more than are needed to offset the production-enhancing effects of the target price. The United States receives a credit in this situation because its national average variable production costs on set-aside acreage are less than the revenue producers would have received from the sale of production on set-aside acreage at the world price. The Agreement's PSE would have provided the United States with a credit based on the foregone profit calculated as a result of the difference between production costs and foregone sales at the world price.

From a trade distortion point of view, the Agreement's PSE would have provided the United States with too much credit for its set-aside requirements; thus, it would have reduced the United States' measured level of support too much. This reduction would have occurred because the U.S. set-aside requirements were larger than the amount needed to fully offset the production-stimulating effects of other government programs. In contrast, a production-based PSE would have directly measured the effect the U.S. set-aside requirements had on production and thus measured what effect they had on trade distortion.

Figure II.1 illustrates this scenario. We examined world and domestic prices in relation to supply with and without set-aside, and compared the level of total government support measured by both the Agreement measure and the production PSE. This analysis shows relative relationships rather than specific numeric calculations.

Figure II.1 (as well as figs. II.2 and II.3) shows this analysis at different levels of world price. Without the set-aside, the supply schedule is S. The supply schedule shows how much producers are willing to supply to the market at different prices. On supply schedule S, equilibrium is reached and producers are willing to supply Q_1 of production when they receive the target price. The target price is a price set by legislation and is used to support producers' income.

Figure II.1: World Price Conditions Under Which the United States May Receive Credit
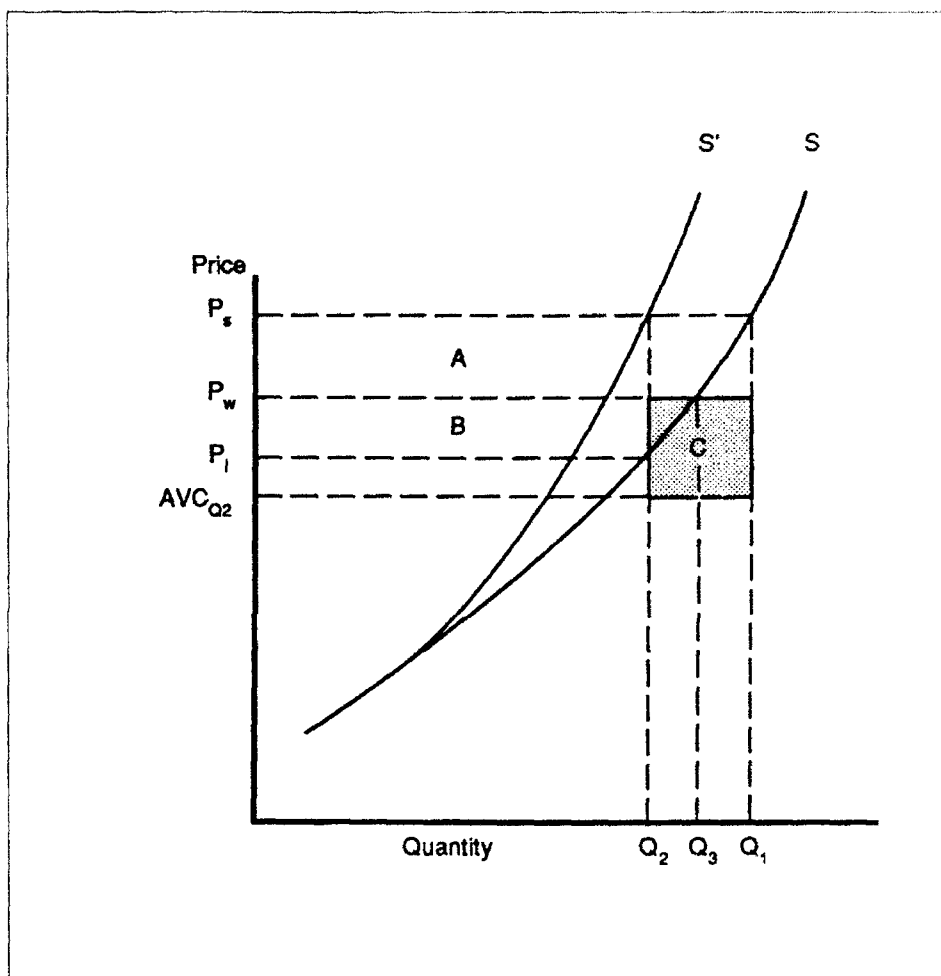
Legend

S = Supply curve without set-aside

S' = Supply curve with set-aside.

P_s = U.S. support price (target price)

P_w = World price.

P_i = Producer incentive price.

AVC_{Q2} = Average variable cost associated with Q_2 level of production

Q_1 = Production at U.S. support price without set-aside

Q_2 = Production at U.S. support price with set-aside.

Q_3 = Production at world price if there had been no set-aside

A · C = Level of government support measured by the Agreement

C = Credit for foregone profit on set-aside acreage provided by the Agreement

B = Level of government support measured by the production PSE

For all figures, when the set-aside requirements are put into effect, the supply schedule shifts to S'. This shift occurs because the set-aside requirements reduce the amount of land producers can plant so that smaller amounts of commodities are supplied at every price. The shift is not uniform because incremental costs increase as farmers expand production when the set-aside program is in effect. This increase occurs because they are prevented from using land to produce additional quantities. The shift in S', therefore, would be greater along the top portion than along the lower portion of the schedule. When the set-aside is in effect, equilibrium is reached and producers are willing to supply Q_2 of production in response to the target price.

Figure II.1 shows what occurs when the Agreement measure provides credit to the United States for set-aside acreage, and it compares the level of government support under this condition with the credit received under a production-based PSE. According to the Agreement, a credit is given if the national average variable costs of production per acre multiplied by the amount of set-aside acreage is less than the revenue that producers receive from the sale of production from set-aside acreage at world price.[3] An adjustment is also made for anticipated differences in yield between set-aside acres and planted acres. This credit is shown as area C. Under these conditions, the Agreement PSE would calculate the level of government support as area A minus area C. Area A represents the difference between the domestic target price and the world price for the quantity farmers will produce when set-aside requirements are in effect.

Under the production PSE, the level of government support is measured by area B. This area is calculated by developing a producer incentive price P_1 and comparing that price with the world price. The producer incentive price is the price at which farmers, if there were no set-aside program, would produce the same amount of commodities they are producing under the actual target price/set-aside combination in effect.

Under this scenario, U.S. production (Q_2) is less than the particular quantity (Q_3) that would have been produced in response to world price (P_w) if there had been no set-aside program. According to the logic of a production-based PSE, the set-aside credit applied under the Agreement would have reduced the measured level of government support too

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[3]If, however, the national average variable cost of producing on set-aside acreage is in fact more than the revenue producers would receive from the sale of production from set-aside acreage at world price, no credit will be given under the Agreement.

much. That is, the set-aside requirements were larger than the amount
needed to fully offset the production-stimulating effects of other gov-
ernment programs. A production-based PSE would measure the extent to
which all government programs, including set-asides, were contributing
to trade distortion by inhibiting production.

Scenario #2

This second scenario demonstrates a situation in which the United
States would not earn a set-aside credit under the Agreement, even
though the set-aside program helps to decrease the trade-distorting
effects of government programs.

Because U.S. agricultural programs provide farmers with target prices
that sometimes exceed the world market price, these programs
encourage farmers to produce more than they would have if they only
received the world market price. In this situation, it is possible for
national average variable production costs on set-aside acreage to be
greater than the revenue producers would receive if they sold their
crops from set-aside acreage at the world price. Under the Agreement,
the United States would not have received a credit for its set-aside
acreage in this situation.

Under a production-based method, however, the United States would
have received a credit because its acreage set-aside programs
encouraged farmers to restrain production despite high target prices.
Without the set-aside requirements, farmers would have produced on
the set-aside acreage to receive the target price. By restraining produc-
tion, the set-aside program results in production levels closer to those
indicated by world prices. Under a production-based method, the United
States would have received recognition for the extent to which its set-
aside requirements reduced production, which would have lowered its
measure of government support.

Figure II.2 illustrates this scenario. Here, the national average variable
costs of production per acre multiplied by the amount of set-aside
acreage is greater than the revenue that producers receive from the sale
of production from set-aside acreage at world price. Therefore, no credit
is given for the use of a set-aside program because, according to the logic
of the Agreement, farmers would not be foregoing profit because of

requirements to set acreage aside.[4] The level of government support
under the Agreement equals areas A + B.

If there had been no set-aside, however, production would not have
equaled Q_2; it would have been an even more trade-distorting amount
(Q_1). The extent to which set-asides reduce production below Q_1 is not
directly reflected in the Agreement measure. It is, however, reflected in
the production-based PSE level of government support represented by
area B. The lower level of support under the production PSE occurs
because the level of production achieved is the same as if the support
price without set-asides was reduced to P_1.

[4]If, however, the national average variable cost of producing on set-aside acreage is in fact less than
the revenue producers would receive from the sale of production from set-aside acreage at world
prices, credit will be given under the Agreement. This situation would occur if the average variable
cost associated with a level of production equal to Q_2, which is shown in figure II.2 to be above world
price, was instead below world price.

**Figure II.2: World Price Conditions Under
Which the United States May Not
Receive Credit**
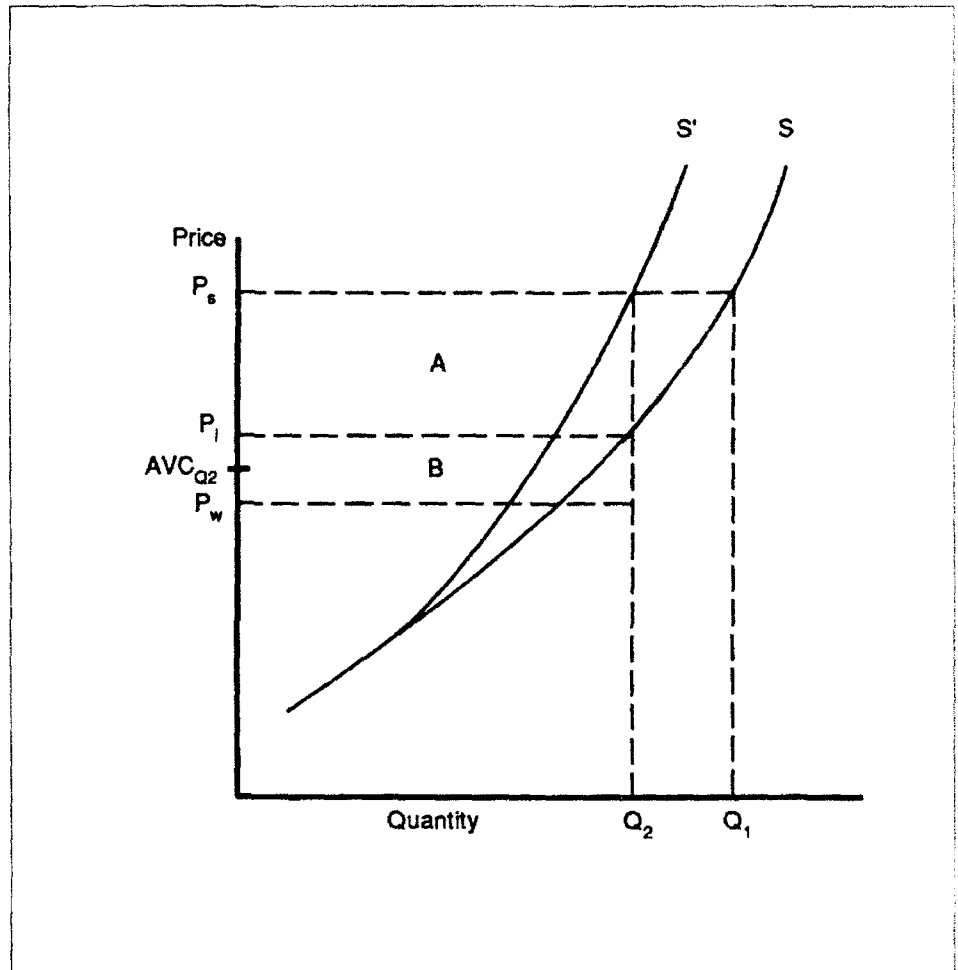
Legend

S = Supply curve without set-aside

S' = Supply curve with set-aside

P_s = U.S. support price (target price)

P_w = World price.

P_i = Producer incentive price.

AVC_{Q2} = Average variable cost associated with Q_2 level of production.

Q_1 = Production at U.S. support price without set-aside

Q_2 = Production at U.S. support price with set-aside

A + B = Level of government support measured by the Agreement

B = Level of government support measured by the production PSE

Scenario #3

This third scenario also presents a situation in which the United States would not earn a set-aside credit under the Agreement when it would under a production-based method. In this case, the level of production achieved under government set-aside requirements and a target price results in the same amount of production that would have been achieved under free trade. That is, the production restraints imposed on farmers by set-aside requirements exactly offset the inducements to expand production provided by high target prices.

Under this scenario, the Agreement would not provide the United States with credit for its set-aside requirements when the variable costs of production on set-aside acreage equal or exceed the revenues producers would receive from the world market. The Agreement's PSE would show that the United States was supporting its agricultural sector, even though its acreage set-aside requirements were fully offsetting the production-enhancing effects of the target price.

In contrast, a production-based method would show that the U.S. government was providing no support to its agricultural sector, which acknowledges that the acreage set-aside program exactly offsets the trade-distorting effects of the government target price.

Figure II.3 illustrates this scenario. Here, the national average variable costs of production per acre multiplied by the amount of set-aside acreage is shown as greater than the revenue that producers receive from the sale of production from set-aside acreage at the world price. Therefore, no credit would be given for acreage set-aside because, according to the logic of the Agreement, farmers would not be foregoing profit because of set-aside requirements.[5] Under the Agreement measure, the level of government support is represented by area A; the United States may receive no credit for set-aside, even though set-aside has functioned to eliminate the trade-distorting effect of the target price. Under the production PSE, however, the measured level of government support would be zero (since P_i equals P_w), thereby reflecting the fact that, in this case, set-asides serve to exactly offset the trade-distorting effects of the target price.

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[5]If, however, the national average variable cost of producing on set-aside acreage is in fact less than the revenue producers would receive from the sale of production from set-aside acreage at the world price, credit would be given under the agreement. This credit would be given if the average variable cost associated with a level of production equal to Q_2, which is shown in figure II.3 to be above the world price, was instead below the world price.

Figure II.3: World Price Conditions Under Which the United States Receives Credit Under the Production PSE, but May Not Under the Agreement
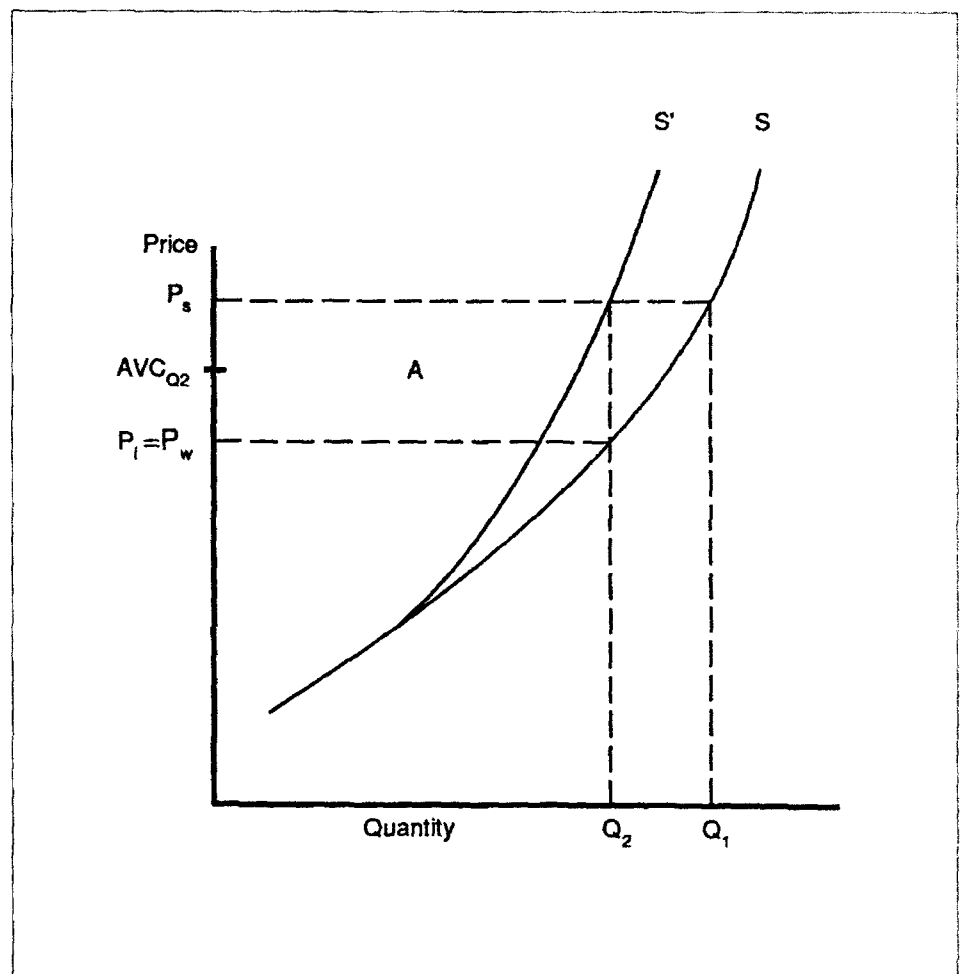
Legend

S = Supply curve without set-aside.

S' = Supply curve with set-aside.

Ps= U.S. support price (target price).

P_w= World price.

Pi= Producer incentive price

AVC_{Q2} = Average variable cost associated with Q_2 level of production.

Q_1= Production at U.S. support price without set-aside

Q_2= Production at U.S. support price with set-aside.

A = Level of government support measured by the Agreement. Level of government support measured by the production PSE (area B) = 0

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